

## SWING BOOM PIVOT MECHANISM

### FIELD

The present invention relates to an improved attachment arrangement for mounting a pivot base to the boom of a Swing  
5 Boom Assembly used on a skidder.

### BACKGROUND OF THE INVENTION

Skidders are used in the forest industry to retrieve and load felled trees. Most consist of a prime mover, and a  
10 grapple attached to the end of a boom. Booms are typically mounted to the prime mover through a base allowing movement in a vertical plane. Side to side movement is accomplished through movement of the prime mover. Added maneuverability can be obtained by adding a pivoting base to which the boom  
15 is attached allowing the boom to swing about a vertical axis relative to the prime mover. This type of boom is commonly referred to as a Swing Boom Assembly.

The method of mounting the pivot to the base and boom  
20 becomes critical to prevent overloading of components. The boom assembly includes the boom, boom cylinder and grapple.

Referring to Figures 1-4, a conventional method of attaching the main body 30 of a pivot base 22 to the boom  
25 assembly 32 of a swing boom 11 is shown. A horizontal pin 24 and boom cylinder 26 connect the boom 28 to the pivot

base 22. The extension of the boom cylinder 26 controls the amount of vertical motion of the boom 28.

The pivot base 22 further comprises an upper spherical bearing 34, lower spherical bearing 36, and a swivel actuator 38. The upper spherical bearing 34, and lower spherical bearing 36 permit the main body 30 of the pivot base 22 to rotate about a vertical axis relative to the fixed base 40. The swivel actuator 38 controls the amount of horizontal rotation of the pivot base 22 and boom 28 about the vertical axis.

As shown in Figure 1, conventional designs incorporate an upper pivot shaft 42, and lower pivot shaft 44 rigidly attached to the main body 30 of the pivot base 22. The upper pivot shaft 42 passes through the upper spherical bearing 34, and the lower pivot shaft 44 passes through the lower spherical bearing 36. The outer races of the upper and lower spherical bearings 34 and 36 are rigidly attached to the fixed base 40.

As best shown in Figures 2-4, the upper pivot shaft 42 extends past the upper spherical bearing 34. A clevis joint 46 is used to connect the boom cylinder 26 to the upper pivot shaft 42. The line of action of the boom cylinder 26 passes through the upper pivot shaft 42 above the upper

spherical bearing 34 creating an overhung loading condition. Depending on the particular loading and position of the boom assembly 32 in the vertical plane, stresses due to the bending moment can become excessive, especially at the  
5 connection between the upper pivot shaft 42 and the main body 30 (see Figure 4). As a result, the conventional method of attachment can lead to cracking and failure of the components comprising the vertical axis of the pivot base under severe operating conditions. As such, there is a need  
10 for an improved attachment method for mounting the pivot base to the boom assembly.

#### SUMMARY

The present invention relates to a swing boom assembly,  
15 which has a fixed base, a pivot base rotatably mounted on the fixed base, and a boom pivotally coupled to the pivot base. The boom is coupled proximate a lower end of the pivot base and has a hydraulic piston cylinder coupled between the boom and an upper end of the pivot base. The  
20 hydraulic piston cylinder is operative to raise and lower the boom. The pivot base has an upper shaft, a main body having a pair of spaced apart clevis plates affixed to each end of the upper shaft, and a spherical bearing rigidly mounted around the upper shaft between the clevis plates and  
25 said bearing having an outer race rigidly mounted to the fixed base.

The hydraulic cylinder assembly may be pivotally coupled to the pivot base at a level intermediate to the clevis plates.

- 5       The clevis plates are preferably integral with the main body.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

Further features and advantages of the invention will  
10 be apparent from the following detailed description, given by way of a preferred embodiment taken in conjunction with the accompanying drawings, wherein:

**Figure 1** is a vertical sectional view through the  
15 middle of the prior art conventional pivot base connection;

**Figure 2** is a perspective view of the prior art conventional pivot base connection;

**Figure 3** is a side view of the prior art main body of the pivot base and conventional upper joint;

20       **Figure 4** is a sectional view along line 1-1 of Figure 2;

**Figure 5A** is a perspective view of an improved Swing Boom Assembly in a neutral pivot position;

25       **Figure 5B** is a perspective view of an improved Swing Boom Assembly in a neutral pivot position;

**Figure 6** is a vertical sectional view through the middle of the improved pivot base connection;

**Figure 7** is a perspective view of the improved pivot base connection .

**Figure 8** is a side view of the main body of the pivot base and improved upper line; and

5      **Figure 9** is a sectional view along line 2-2' of **Figure 8**

#### **DETAILED DESCRIPTION**

Referring to **Figures 5A** and **5B** the movement of the main parts of a swing boom **10** are shown. A fixed base **52** is  
10    mounted rigidly to the prime mover (not shown). The boom assembly **60** is attached to the pivot base **46**. The boom assembly **60** includes the boom **14**, boom cylinder **58**, and grapple (not shown). The grapple attaches to the boom **14** at the grapple attachment point **16**. The pivot base **46** rotates  
15    from side to side as shown by double sided arrow **20** in **Figure 5A**. The pivot base **46** is shown rotated counterclockwise in **Figure 5B**. The extension of the boom cylinder **58** controls the amount of vertical motion of the boom **14**. The boom **14** may move in a horizontal plane with  
20    the movement of the pivot base **46** as shown by arrows **20**, as well as a vertical plane as illustrated by arrows **21** in **Figure 5B**.

Referring to **Figures 6-9**, an improved design for the  
25    attachment of the main body **54** of a pivot base **46** to the boom assembly **60** is mounted to the main body **54** of the pivot

base 46. The pivot base 46 is modified from the conventional method described in connection with Figures 2-5 at the upper pivot shaft 48. Similar to the conventional method, the outer race of the upper spherical bearing 50 is rigidly mounted to the fixed base 52. However, the main body 54 of the pivot base 46 is extended forming an integral clevis around the upper spherical bearing 50, and both ends of the upper pivot shaft 48 are rigidly mounted to the main body 54 (see Figure 9). Advantageously, the new geometry substantially reduces the bending moment on the upper pivot shaft 48 relative to the main body 54, and resultant stresses in the upper pivot shaft 48.

Accordingly, while this invention has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications of the illustrative embodiments, as well as other embodiments of the invention, will be apparent to persons skilled in the art upon reference to the description. It is therefore contemplated that the appended claims will cover any such modifications or embodiments as fall within the true scope of the invention.